--88. The system of claim 85, wherein each component has a second marker on the surface of the component, wherein the second marker indicates the predetermined location of the leads.

89. The system of claim 85, wherein the marker detector is directed toward the feed source and has a signal output associated with the predetermined orientation of the leads.

90. The system of claim 85, wherein the pick and place machine comprises:

a pick spindle having a plurality of pick heads; and

a placement spindle having a plurality of placement heads.--

REMARKS

1. Status of the Application

Claims 77-87 are pending in the application and stand rejected. In this Amendment, claims 77 and 85 were amended and new claims 88-90 were added. No new matter has been introduced.

2. Claim Rejections under 35 U.S.C. §103

Claims 77-87 were rejected under 35 U.S.C. §103(a) as being unpatentable over Janisiewicz et al. (US 5,040,291) in view of Livengood et al. (US 5,805, 421) and in further view of Harada (US 4,675,993).

The Office Action provides that "Livengood discloses fiducial markers and comparing steps thereby correctly positioning components in printed circuit boards". Livengood discloses fiducial markers 33 on the substrate ("package fiducials") and fiducial markers 35 ("chip fiducials") in the first metal layer (M1) of the chip 40. See column 5, lines 15-21, 60-67. The

package fiducials 33 are aligned to pads on the substrate 43 and are used to locate approximately the chip 40 by aligning the chip to the pads. The chip fiducials 35 are then exposed by etching or other methods to enable "virtual navigation of circuit of the chip from the bottom of the chip". See column 6, lines 15-26, and column 7, lines 24-47. Livegood also discloses using chip fiducials 35 "to accurately locate points along the bottom surface of chip 40 which lie directly below corresponding, determinable points in the circuitry on top of chip 40". See column 8, lines 20-30.

The Office Action provides that " Harada discloses a fiducial marker detector, comparing steps and a controller thereby accurately imaging components for digitization and placement". Harada discloses a "magnetic mark" on an electronic component and a vacuum fastener having a magnetic sensor. The vacuum fastener picks the component so that the magnetic mark coincides with the magnetic sensor.

Clearly, the devices described in Livengood and Harada operate on different principles and have different fiducial markers that are used differently. The teachings of Livengood and Harada cannot be combined without destroying the functionality of the corresponding devices. Moreover, there is no motivation or suggestion in the cited art for combining theses references.

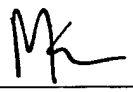
Even if these references were combinable to each other and to Janisiewicz, however, such combination would still fail to disclose the component transfer system claimed in independent claims 77, 82 and 85. Even in combination, the cited references fail to disclose a component transfer system that detects optically a superficial marker on a surface of a component, wherein the superficial marker indicates an alignment of the leads of the component and the generated alignment data pertain to alignment of leads. Therefore, independent claims 77, 82 and 85, and, for the same reasons, the claims that depend from claims 77, 82 and 85, are patentable over the cited prior art.

3. Conclusion

Applicant submits that all of the pending claims are in condition for allowance. Accordingly, reconsideration and passage to allowance of the subject application at an early date are earnestly solicited. If the undersigned can be of assistance in advancing the subject

application to allowance, the Examiner may contact the undersigned at the telephone number set forth below.

Respectfully submitted,



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Version With Markings to Show Changes Made

In The Claims

Claims 77, 82 and 85 were amended as follows:

77. (Amended) A component transfer system for transferring at least one electrical component to be placed on a substrate, wherein the component [that] has a superficial fiducial marker [thereon] on a surface of the component and wherein the fiducial marker [that] indicates an orientation of a plurality of leads protruding from the component, said component transfer system comprising:

a component feed source supporting the at least one component;

a component transfer mechanism oriented to retrieve the at least one component from the component feed source and place said retrieved component in a transferred area such that the fiducial marker on said retrieved component is [in a detectable location] visible for detection;

[a] an optical fiducial marker detector oriented to detect [the detectable location of] the fiducial marker on said retrieved component and generate alignment data for said retrieved component; and

a controller coupled to said fiducial marker detector for receiving said alignment data therefrom for said retrieved component and containing instructions which, when executed, cause said controller to compare said alignment data for said retrieved component to desired alignment data indicative of desired lead orientations, said controller sending realignment signals to said component transfer mechanism for said retrieved component wherein the alignment data therefor differs from said desired alignment data to cause said component transfer mechanism to realign said retrieved component when the alignment data therefor differs from the desired alignment data.

82. (Amended) A component transfer system for transferring at least one electrical component to be placed on a substrate, wherein the component [that] has a superficial fiducial marker [thereon] on a surface of the component and wherein the fiducial marker [that] indicates

an orientation of a plurality of leads protruding from the component, said component transfer system comprising:

a component feed source supporting the at least one component;

a component transfer mechanism oriented to retrieve the at least one component from the component feed source and place said retrieved component in a transferred area such that the fiducial marker on said retrieved component is [in a detectable location] visible for detection;

[a] an optical fiducial marker detector oriented to detect the detectable location of the fiducial marker on said retrieved component and generate alignment data for said retrieved component; and

a controller coupled to said fiducial marker detector for receiving said alignment data therefrom for said retrieved component and containing instructions which, when executed, cause said controller to compare said alignment data for said retrieved component to desired alignment data indicative of desired lead orientations, said controller sending realignment signals to said component transfer mechanism for said retrieved component wherein the alignment data therefor differs from said desired alignment data to cause said component transfer mechanism to move said retrieved component to a discard area when the alignment data therefor differs from the desired alignment data.

85. (Amended) A component transfer system comprising:

a plurality of electrical components for placement on one or more substrates, each component having two sides that are substantially parallel to each other and that each have an equivalent number of leads protruding therefrom, and wherein each component has a first marker on a surface of the component and wherein the first marker [that] superficially alters a physical appearance of the component to indicate a predetermined orientation of the leads, said plurality of components supported in a component feed source;

a pick and place machine oriented to retrieve a component from the feed source and place the retrieved component in a transfer area such that the fiducial marker is visible for detection;

[a] an optical marker detector oriented to detect the marker on the retrieved component and generate alignment data that is indicative of the position of the marker within the transfer area; and

a controller in communication with said marker detector for receiving said alignment data therefrom and containing instructions which, when executed by the controller, cause the controller to compare the alignment data received from the marker detector and compare it to predetermined alignment data to ascertain whether the retrieved component is correctly aligned within the transfer area.

New claims 88-90 were added.